



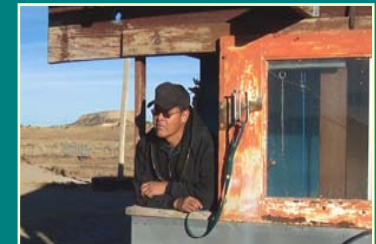
Church Rock Uranium Monitoring Project



Larry J. King
Resident, Churchrock Chapter,
Navajo Nation, New Mexico

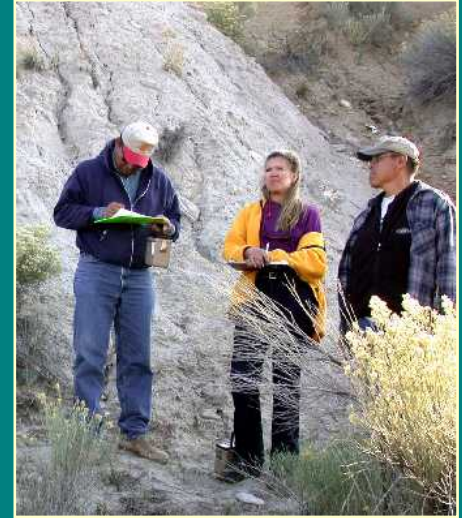


**USEPA Community Involvement
Conference, June 2007**



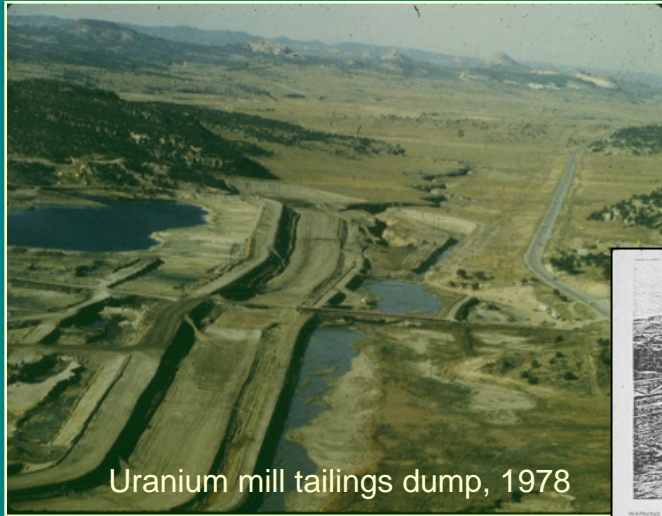
My Story (briefly)

- Lifelong resident of Churchrock Chapter
- Played on uranium waste piles as kid
- Worked in underground mine for 7 years in 1970s-1980s
- Home, grazing land next to abandoned uranium mine, site of proposed new mining
- Water, sewer technician for Indian Health Service
- Community liaison for CRUMP, involved in assessments (photos at right)
- Joined Eastern Navajo Diné Against Uranium Mining in 1997 to oppose proposed *in situ* leach mining on my grazing lands

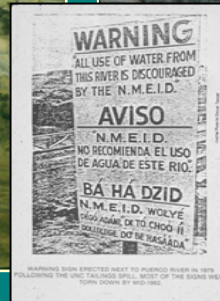


Our Community's Story:

50 Years of Impacts from Uranium Mining



Uranium mill tailings dump, 1978



Tailings dam failure, 7/16/79



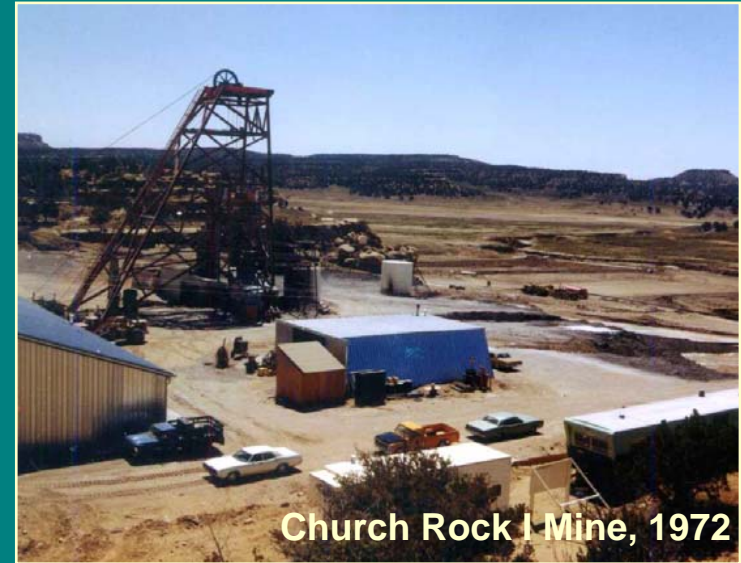
Navajo home next to uranium mine waste dump, 2005



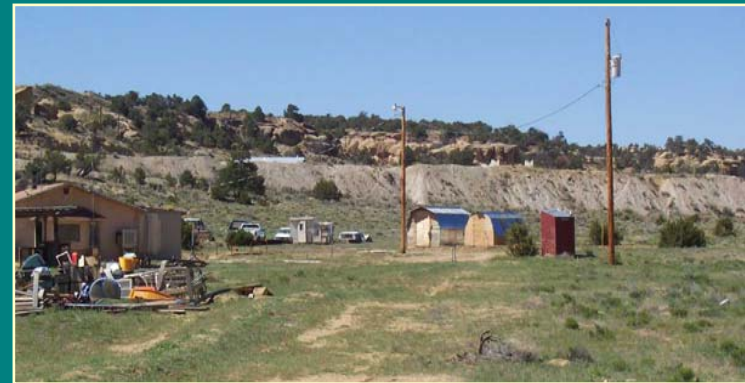
Radium-contaminated soil removal, Red Water Pond Road, 2007; partially reclaimed abandoned mine in rear

Church Rock Mining History (cont'd)

- Active mining, early-'50s thru mid-'80s
- 19 abandoned mines, 1 closed uranium mill in area (see map, next slide)
- '79 tailings dam failure — U.S.'s largest release, by volume, of radioactive waste
- Mine dewatering for 20 years
- Livestock studies of '80s —
 - uptake of radionuclides in muscle, organs of sheep, cattle
- Little environmental monitoring since
- **No health studies ever conducted**
- New ISL mining proposed in Churchrock, Crownpoint chapters



Church Rock I Mine, 1972



Unreclaimed mine waste dump next to residence, 2007

Coyote Canyon Chapter

ABANDONED URANIUM MINING & MILLING SITES
NORTHERN CHURCH ROCK CHAPTER
NAVAJO NATION, MCKINLEY COUNTY, NEW MEXICO
(gamma readings in uR/hr)

Nahodishgish,
Standing Rock
Chapters

NAVAJO RESERVATION 1880 E. Q. BOUNDARY

CHURCH ROCK #1 (KERR McGEE)
CHURCH ROCK #1E (KERR McGEE)
(150 - 180)

Study Area A

Church Rock Chapter

Study Area B

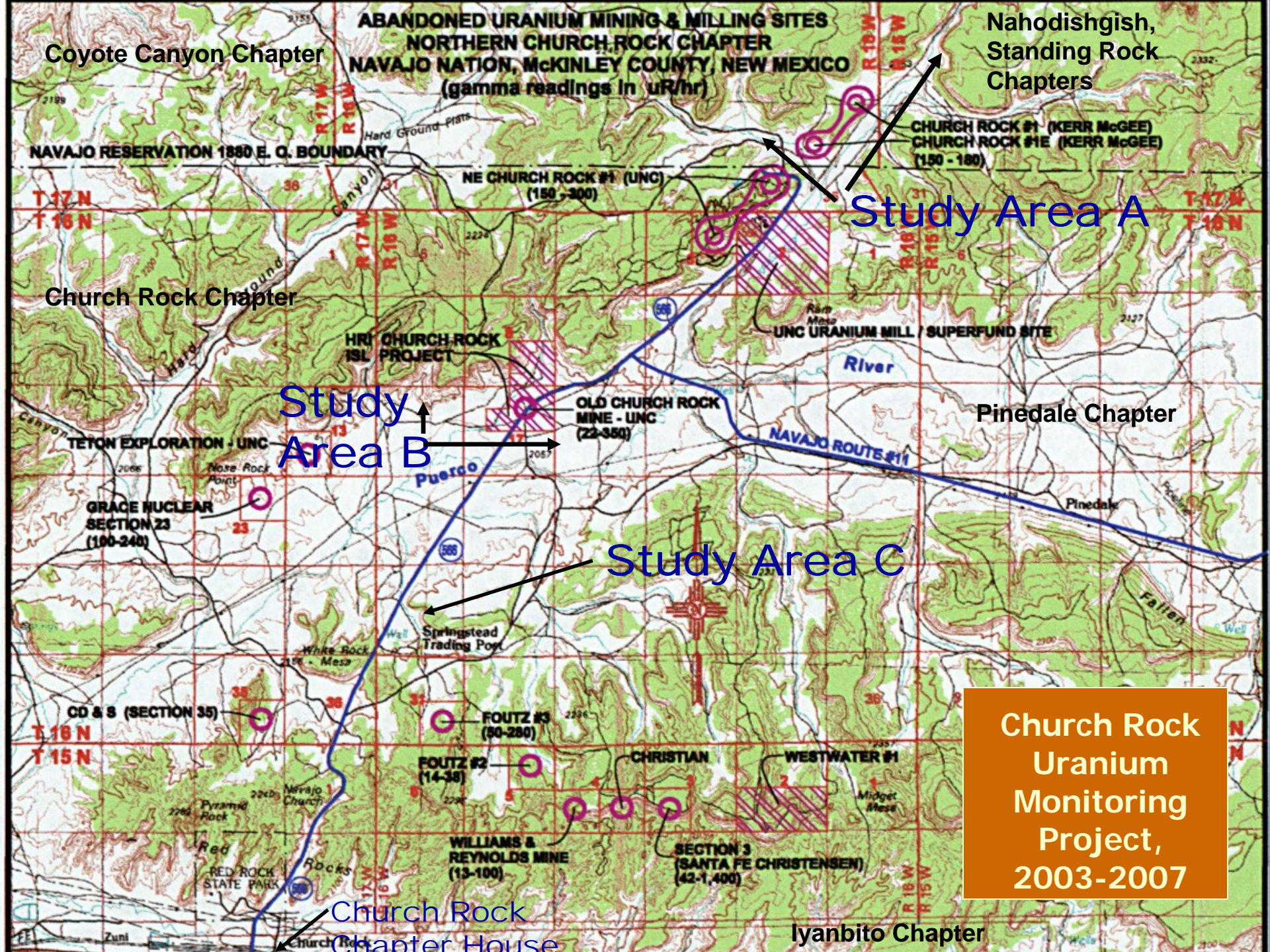
Study Area C

Pinedale Chapter

Church Rock
Uranium
Monitoring
Project,
2003-2007

Church Rock
Chapter House

Iyanbito Chapter



CRUMP History

- Church Rock Uranium Monitoring Project (CRUMP) formed in 2003 to assess impacts of past uranium mining in community
- Churchrock Chapter resolutions adopted opposing new mining, requesting environmental, health studies (2000, 2003)
- 900-home housing project proposed (2001)
- Environmental data needed for community planning, decision-making
- MTA-Fund grants (2003, 2004), plus in-kind support from community members, tribal, state, federal agencies, universities
- Grant report to RESOLVE, Inc., 2007



**Former Churchrock Chapter
CSC Edward Carlisle (top); EH
training 12/3/02 (center);
CRUMP meeting, 6/24/03**

CRUMP Goals



- Assess contaminants in water, on land, in air in residential areas near abandoned uranium mines
 - Establish human exposures for future health studies
- Train, involve local people in assessments
- Ensure community oversight of mine cleanup
- Educate, report findings

CRUMP Collaborators

- Churchrock Chapter, NN
- Diné College UEP
- Navajo AML, Navajo EPA, Navajo Dept. Water Resources
- NM Environment Department
- Southwest Research & Information Center
- TAMS Center-NAU/ITEP
- UNM/CEHP
- USEPA-9, Las Vegas Lab

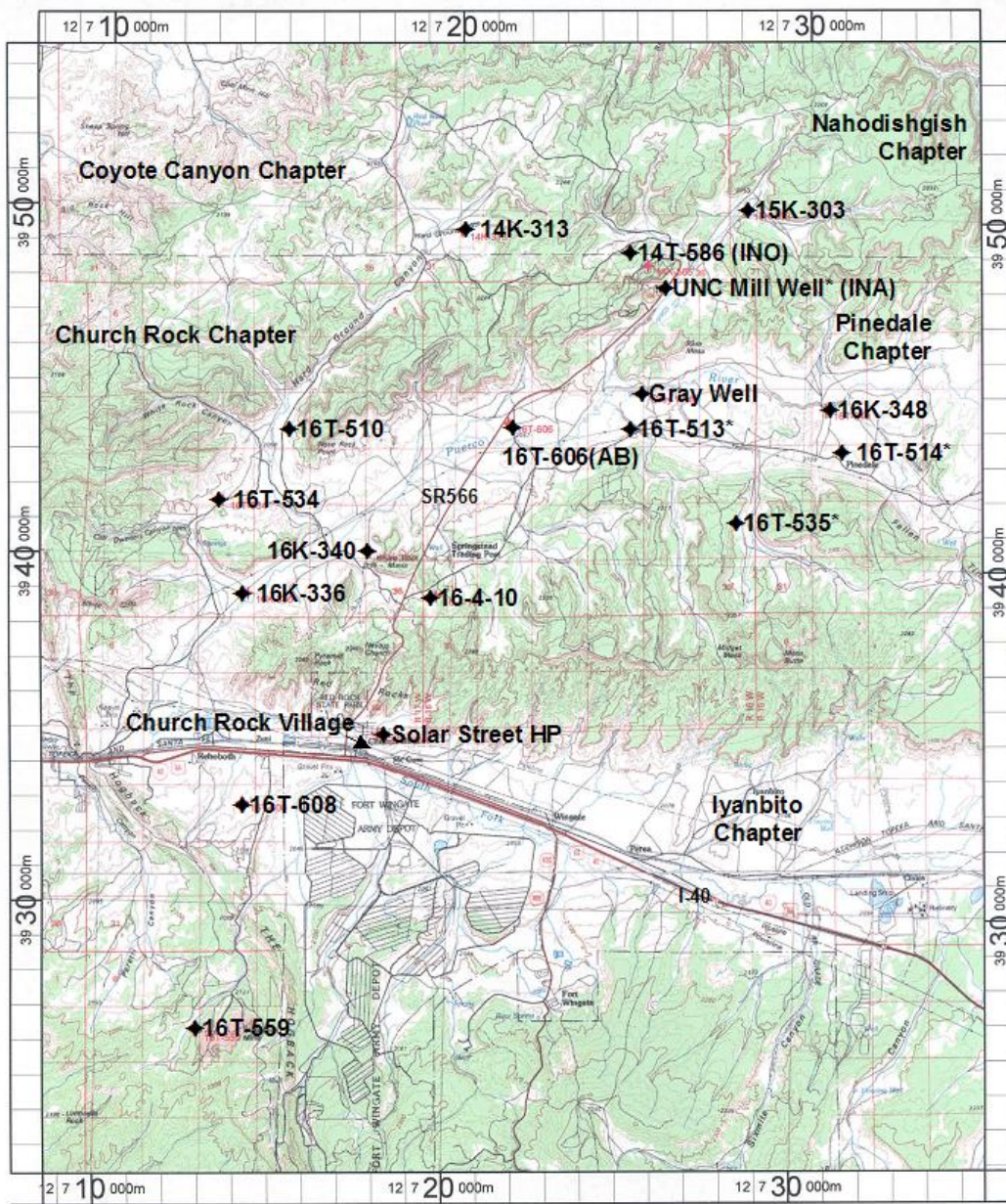


Water Quality Assessment



- 1999 survey: >80% CR residents haul water even when connected to public water supply system
- Water is hauled for all uses: human consumption, domestic, livestock
- Tested for general chemistry, heavy metals, radionuclides
 - no testing for bacteria, solvents, petroleum products

Water Quality Assessment (cont'd)



Name: GALLUP
Date: 2/24/2004
Scale: 1 inch equals 2.254 miles
Source: Navajo Dept. Water Resources; Rev'd, SRIC 3/24/07




















































Location: 12 721718 E 3938716 N
Caption: Church Rock Well Listing
AB = abandoned; INO = inoperative; INA = inaccessible (as of 1/24/06); *Indicates well sampled by DINE H Project

Copyright (C) 1997, Maptech, Inc.

- Focused on “unregulated” water sources
 - wells, springs not regularly tested, treated for safety
- 9 in Church Rock Chapter
- 2 in Coyote Canyon
- 5 in Pinedale
- 1 in Nahodishdish (Dalton Pass)

Presentation of Water Quality Results:

“Red light”,
“Yellow caution”,
“Green light” use
recommendations

Well or Water Source	Pollutants Exceeding NPDWS	Pollutants Exceeding NSDWS	2006 Status	Use Recommendations		
				Human	Domestic	Livestock
Annie Grey	Uranium (1/2 std.)	Sulfate, TDS	OP			
Solar St.	Iron	pH, Sulfate, TDS	INOP (2004)			
14K-313	Iron	Sulfate, TDS, Tot. Hardness	OP			
14T-586	#Arsenic, Iron, #Selenium	Sulfate, TDS, Tot. Hardness	ABD (2003)			
15K-303	#Arsenic, Iron, Selenium	Sulfate, TDS	OP			
16-4-10	Gross alpha, Uranium		OP-LS only			
“NO HUMAN USE” ADVISORY, 2004						
16K-336	Iron	TDS	OP			
16K-340	#Arsenic, Iron	Sulfate, TDS, Tot. Hardness	OP			
16T-348		pH, TDS	OP			
16T-510	Arsenic	Not tested	INOP (2006)			
16T-513*	Iron	Sulfate, TDS**	OP			
16T-514*		pH, TDS	OP			
16T-534	#Arsenic, Iron, #Selenium	pH, SO ₄ , TDS	OP			
16T-535*	Iron	Fluoride, pH	OP			
16T-559	#Selenium	PH	OP			
16T-606	Gross alpha, Iron, Radium	Sulfate, TDS, Tot. Hardness	ABD (2005)			
16T-608	#Selenium	Chloride, pH, TDS	OP			

Notes: * Wells sampled by DiNEH Project, 2005-2006; ** TDS estimated from conductivity values (750 uS/cm ~500 mg/l); # Indicates average of two or more values exceeds NPDWS. **Abbreviations:** ABD = abandoned; INOP = inoperative; LS = livestock-only use; OP = operating.

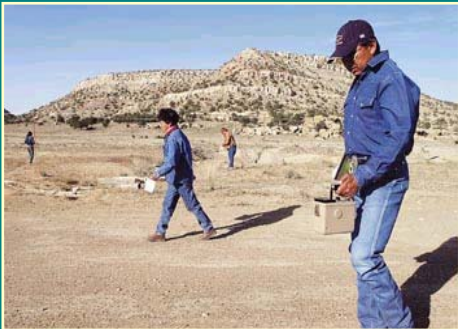
Summary of Water Quality Findings

- Water quality results compared with USEPA's national primary and secondary drinking water standards (NPDWS, NSDWS)
 - Identical to Navajo Nation Safe Drinking Water standards
- None of 17 water sources tested met all primary and secondary standards, and could not be recommended for human consumption
 - 3 of 17 recommended for domestic uses (cooking, bathing, etc.)
- 1 well (16T-606) exceeded NPDWA standard for radium-226
 - Windmill located <0.5 mile from abandoned mine, completed in same formation;
 - Abandoned in 2005 at request of Churchrock Chapter
- 1 well (16-4-10) exceeded NPDWA standard for uranium
 - Well is operable, but use is discouraged; local residents given health advisory
- 7 water sources suitable for livestock, another 9 are marginal for livestock watering
- Avoid human use of unregulated water sources

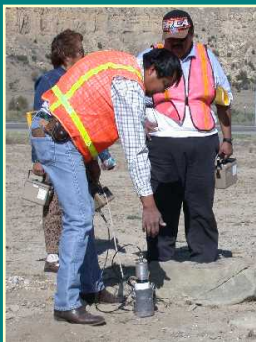
Gamma Radiation Monitoring



- 20+ people from Churchrock, Navajo Nation, SRIC, TAMS Center, USEPA participated in surface gamma surveys
 - community members trained in instrument calibration, field use, data transcription (left)

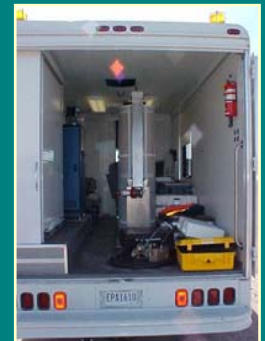


- Gamma radiation levels measured with hand-held instruments (middle and bottom left), USEPA “Scanner Van” (below) in October 2003



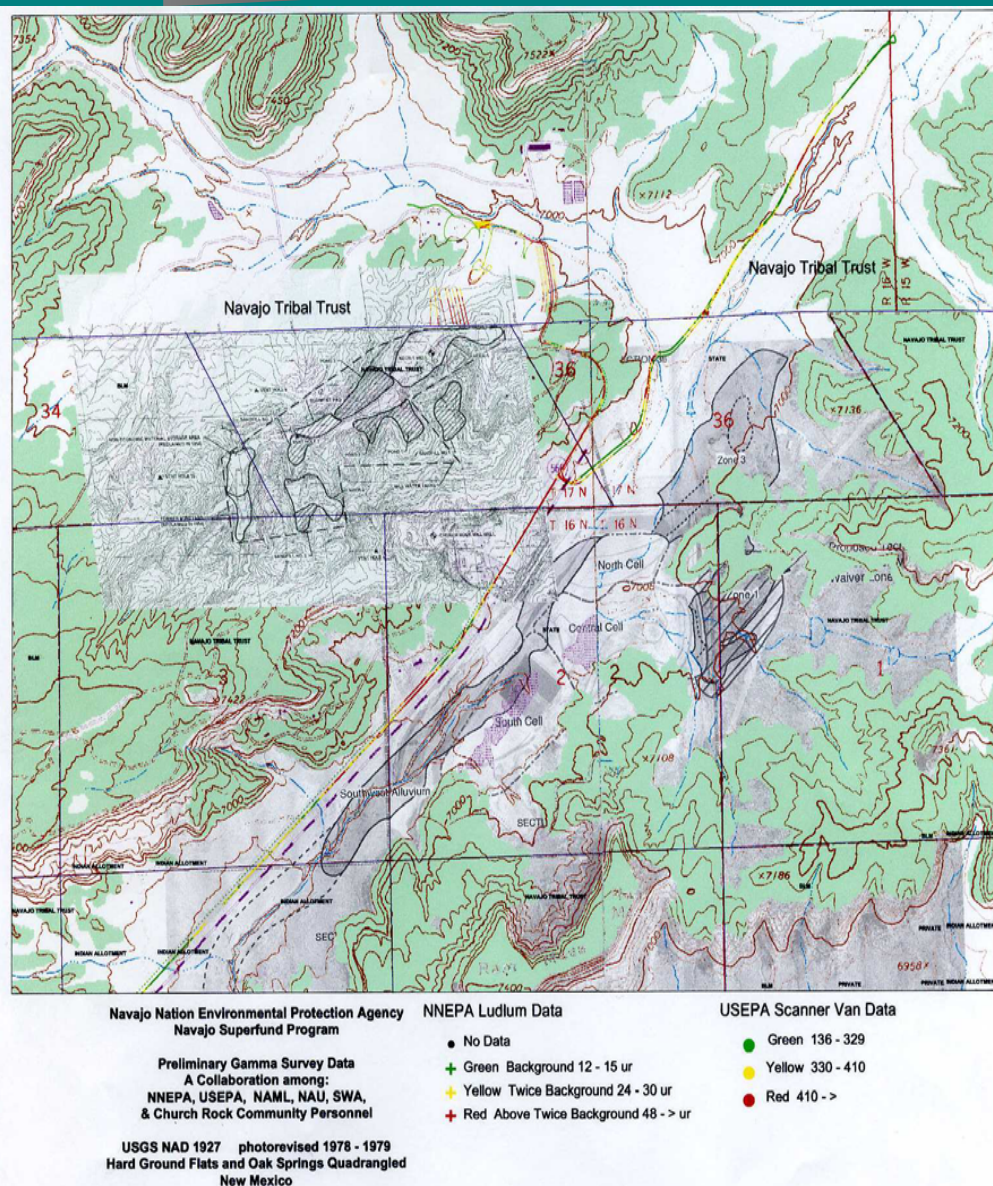
Instrumentation:

- Hand-held: Ludlum-19 gamma detectors, lent by NNEPA-Superfund, Navajo AML
- Scanner Van: 2 Sodium-Iodide (Nai) detectors that “scan” up to 200’ from truck; provided by USEPA Las Vegas lab



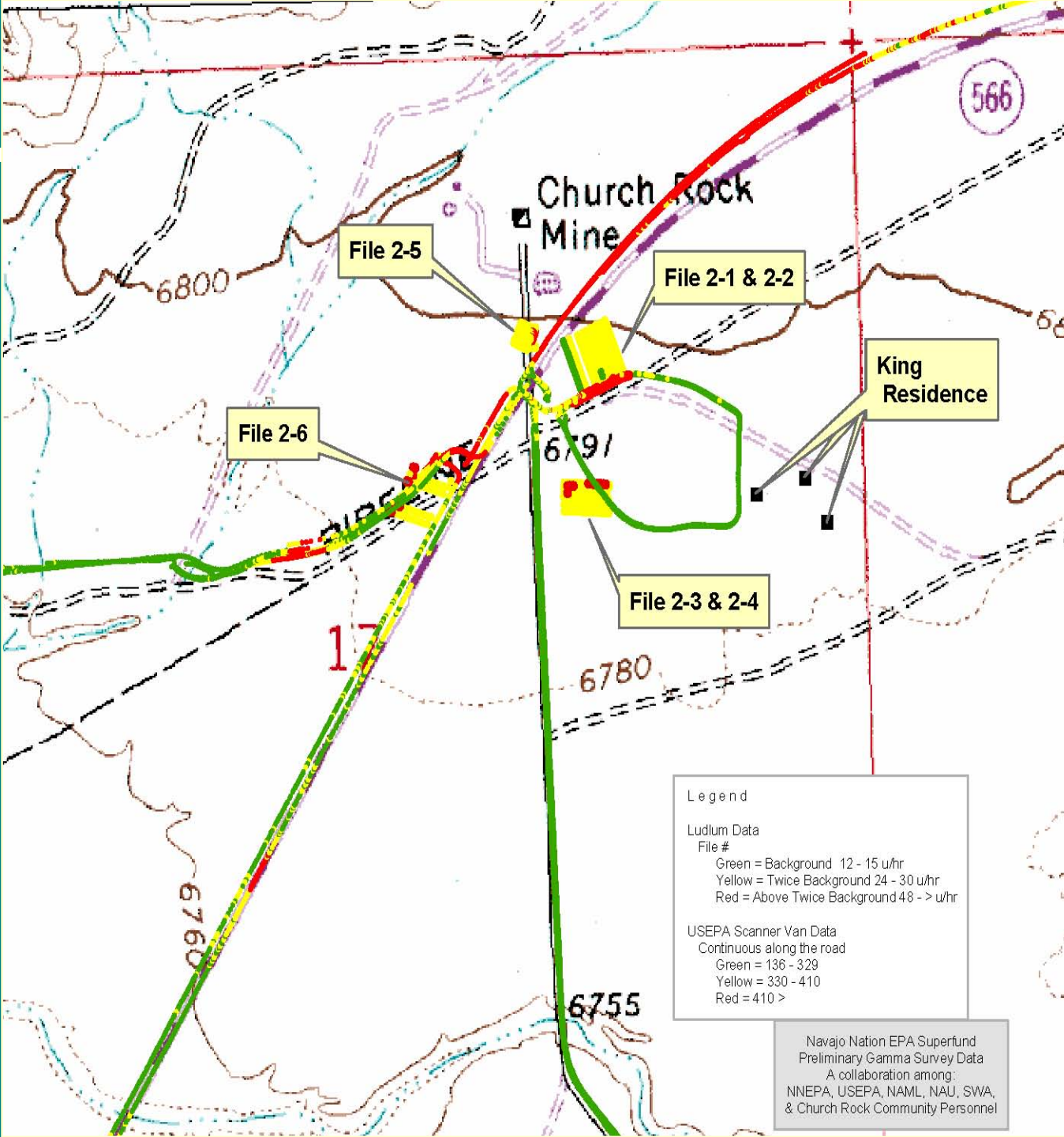
Summary of Gamma Survey Results

- “Background,” or normal, gamma rates established from Scanner Van, hand-held measurements
 - 11-13 uR/hr
- Gamma rates significantly elevated over background along State Rt. 566 from Old Churchrock Mine, past UNC uranium mill, to Northeast Church Rock mine (right)
- Surface radiation levels significantly above background detected near residences in Study Areas A and B



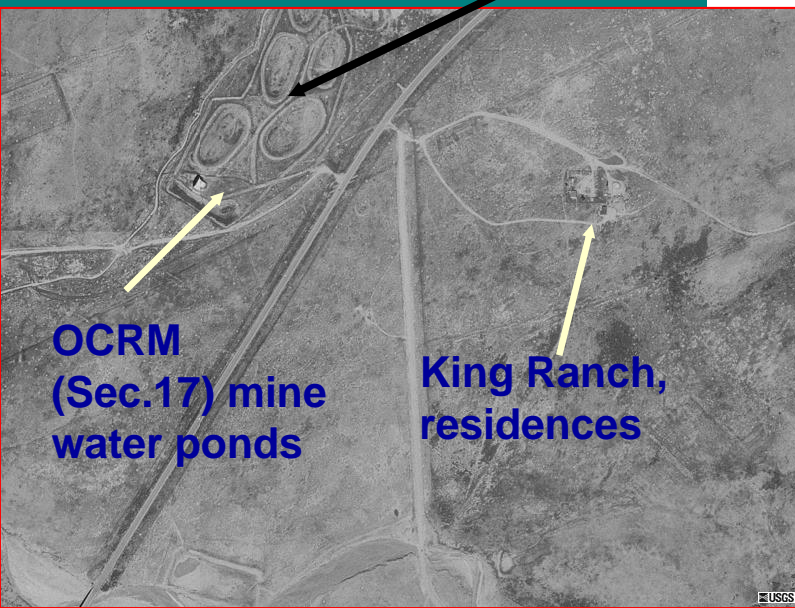
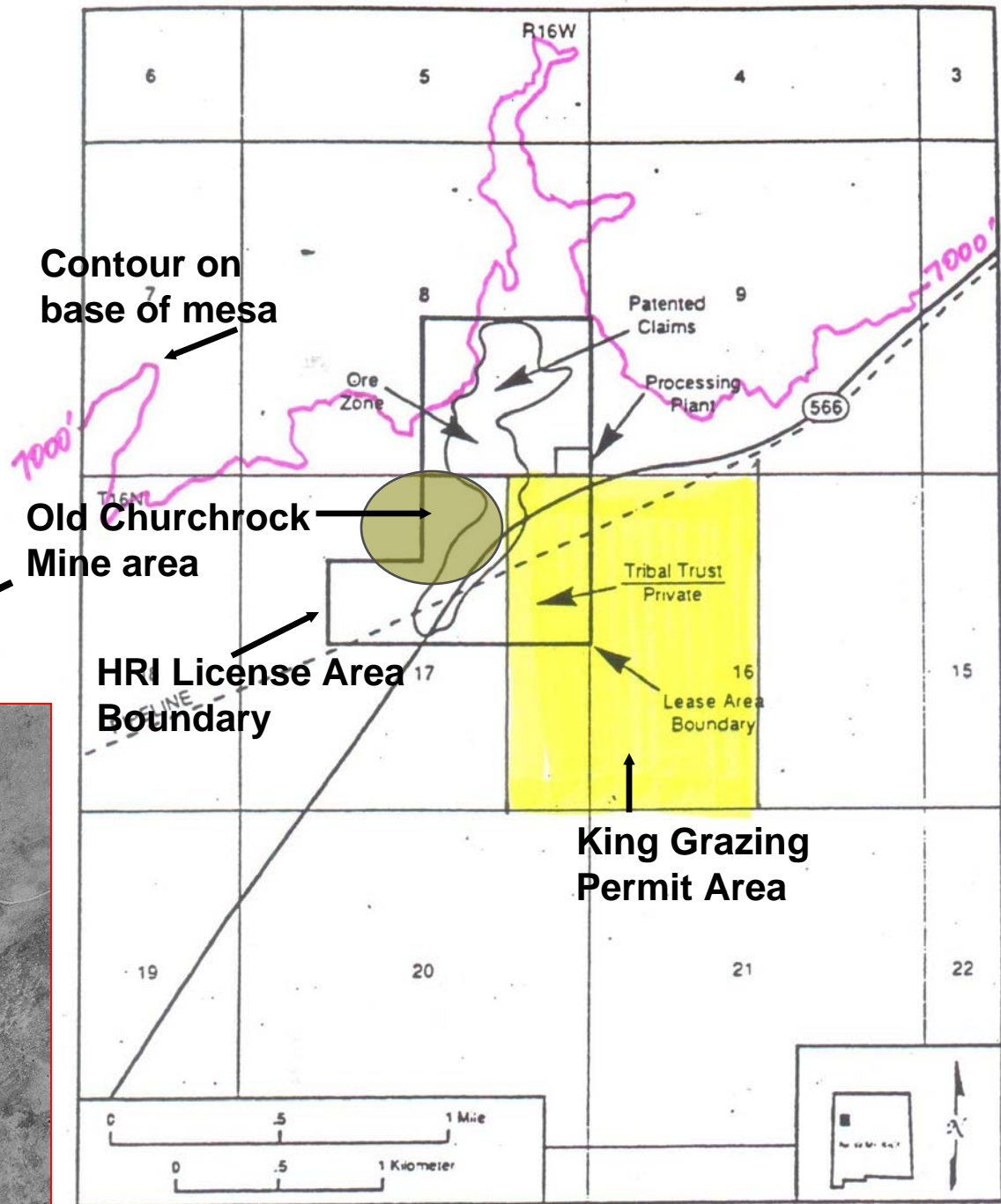
Study Area B: Offsite transport of contaminated mine waste

Gamma rates >2x
back-ground
(shown in red)
indicate transport
of residual mine
waste from Old
Church Rock Mine
onto King Ranch
land

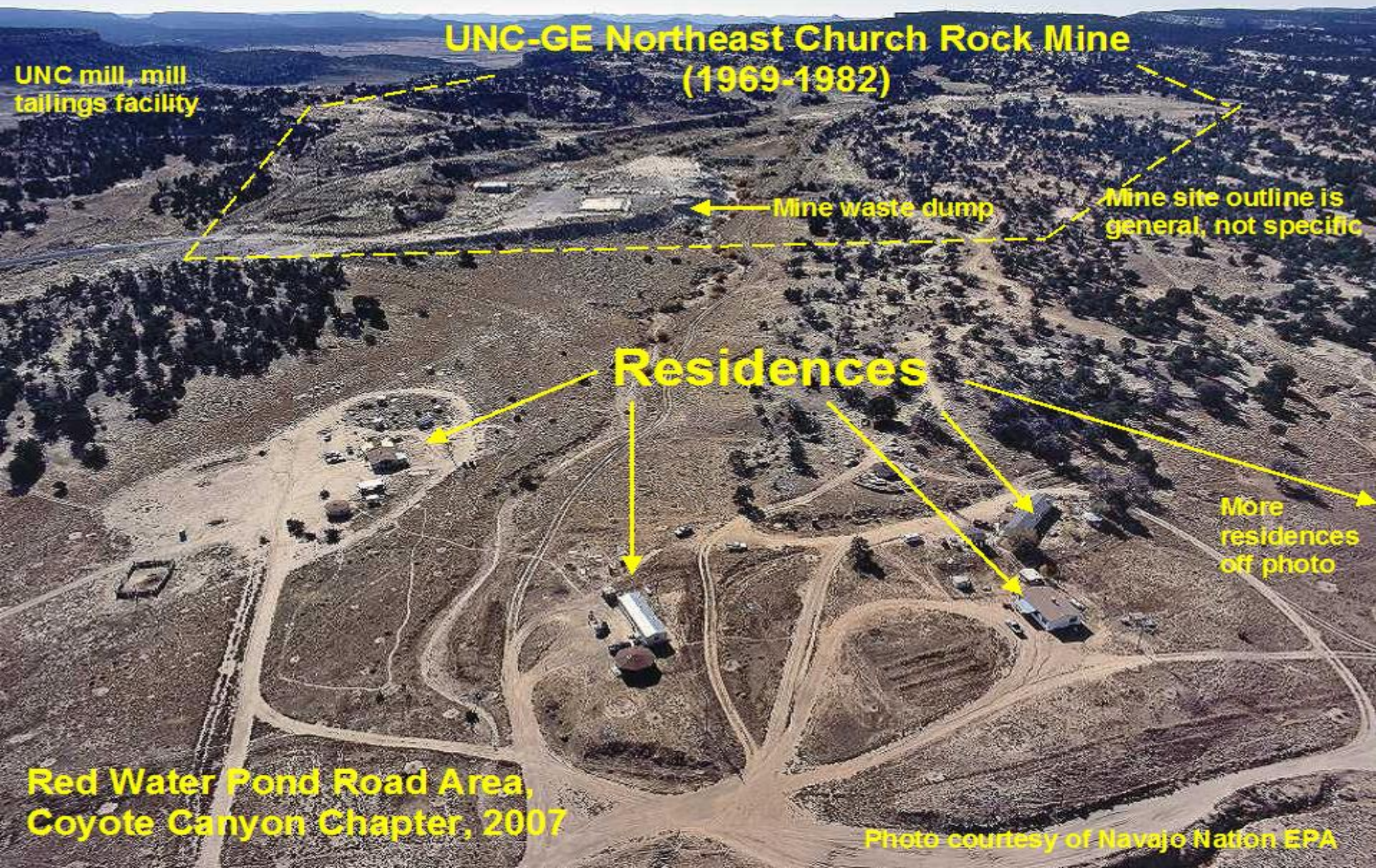


Environmental Exposures

Old Church Rock Mine (shaded oval, right; aerial below) operated '60-'62, '78-'82; King Ranch lands in yellow shaded area



Northeast Church Rock Mine Area (Study Area A1)



**UNC-GE Northeast Church Rock Mine
(1969-1982)**

**UNC mill, mill
tailings facility**

Mine waste dump

**Mine site outline is
general, not specific**

Residences

**More
residences
off photo**

**Red Water Pond Road Area,
Coyote Canyon Chapter, 2007**

Photo courtesy of Navajo Nation EPA

Chronic Environmental Exposures, Red Water Pond Road area

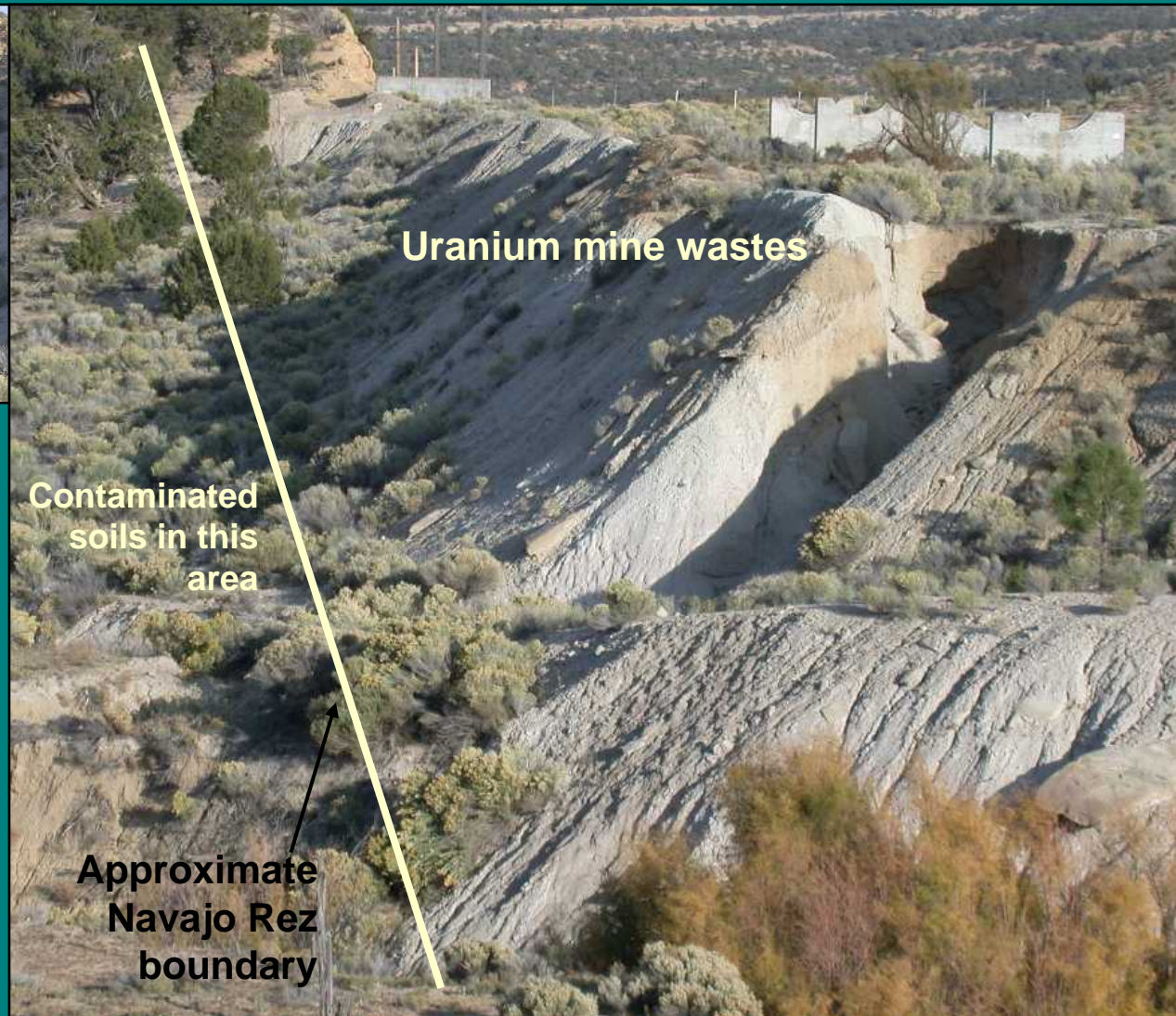


- 14 Navajo homes located within 0.5 mile of two abandoned mines
- Gamma radiation levels 9x to 12x greater than background in sands in the arroyo that received mine dewatering effluents for nearly 20 years
- Local kids played in sand having gamma levels 5 to 10x background!
- Cattle, sheep routinely grazed on and near mines, drank water discharged from underground mines; local people consumed livestock

**CRUMP radiation team
members (below)**



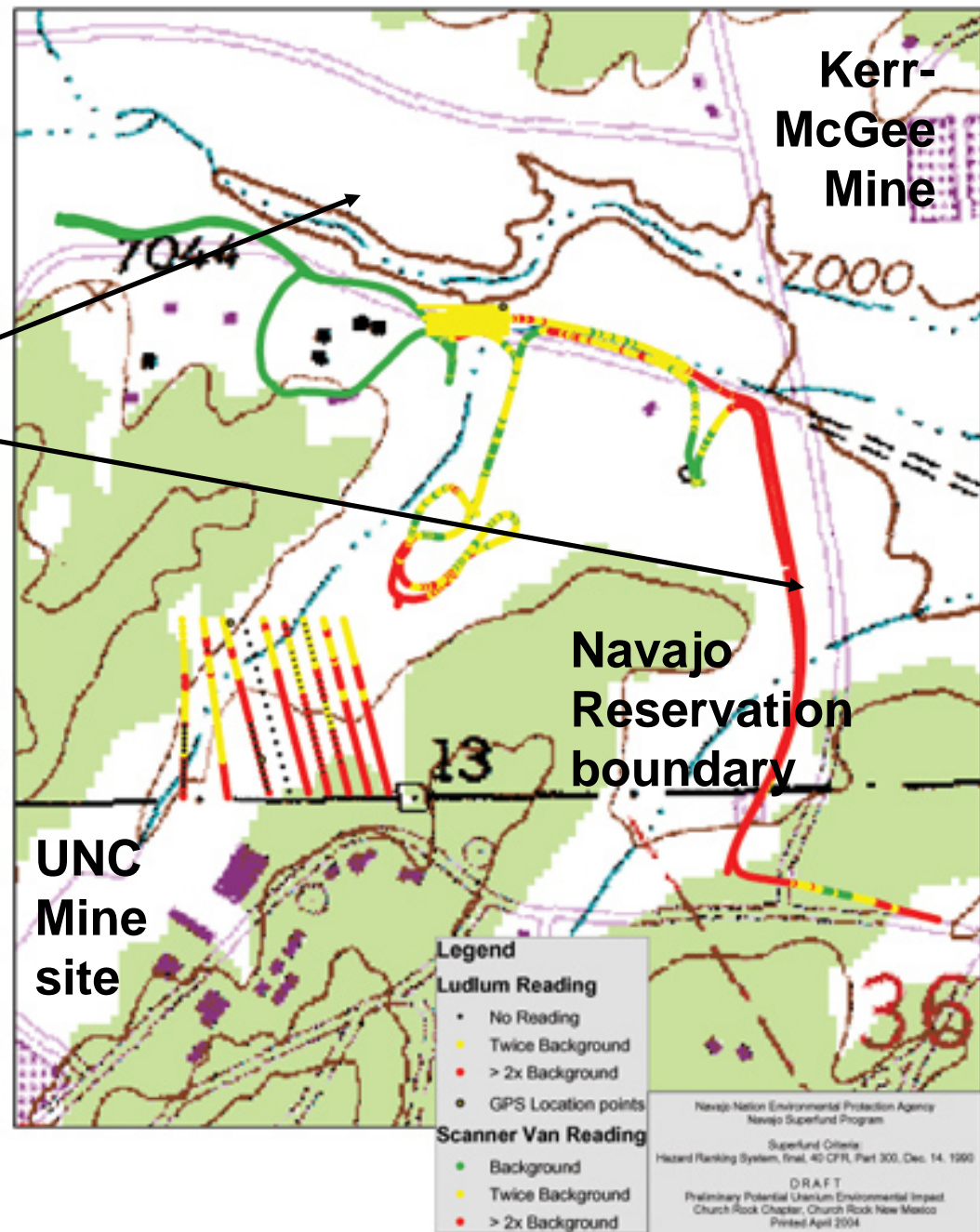
Gamma radiation
levels at the base of
mine-waste pile
ranged up to 20x
background at the
Reservation line;
soils contained
elevated U



Study Area A1: Map of Gamma Radiation Levels

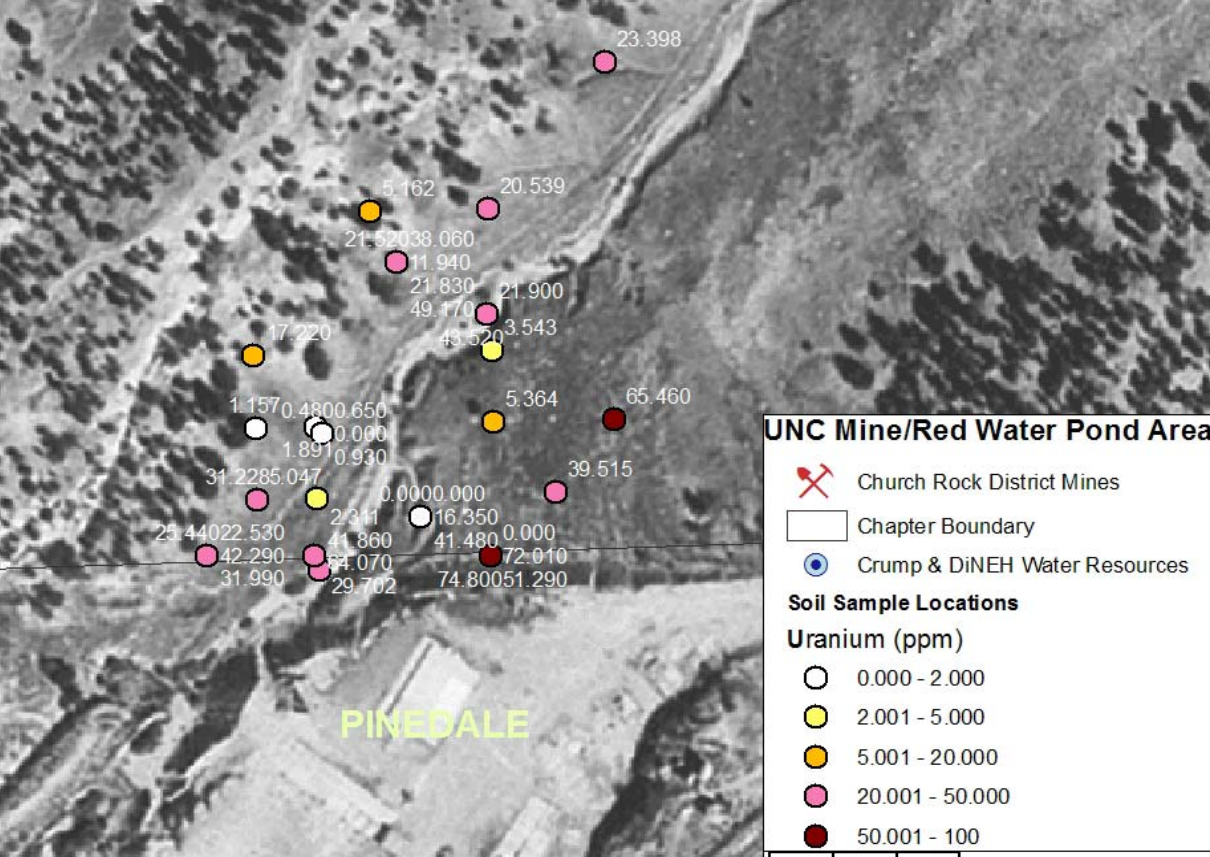
Red Water Pond Road

- 14 Navajo residences sandwiched between two large abandoned uranium mines
- Gamma radiation levels $>2x$ background shown by red dots and lines



Map by J. Begay, NNEPA/Superfund

Soil Sampling for Uranium, Heavy Metals in Study Area A1



- Soil samples collected north of NECR Mine waste dump by Stanford Univ. student C. George, December 2004 and August 2005
 - 74% (37 of 50) samples > 5 ppm, which is upper limit of “background”
 - 58% (29 of 50) samples > 16 ppm, which is USEPA’s Preliminary Remediation Goal for cleanup of contaminated soils around residences
 - Uranium levels *increased* with depth in soil column
 - Uranium levels *decreased* with distance from mine waste dump

Reclamation, Regulatory Issues



- CRUMP gamma surveys, uranium-in-soil studies prompted responses by USEPA, NNEPA
- May 2007: USEPA removed nearly 6,000 cubic yards of radium-contaminated soils from around residences (upper left)
 - Soil removal may not be sufficient for long-term protection of public health
- 2007-2009: Reclamation of NECR mine site (lower left)
 - Goal of community, Navajo Nation is complete removal of mine wastes from tribal trust land

Indoor Radon Monitoring

- ◆ 7-day radon canisters placed in 150 homes in Feb.-March '04; valid results from 143 homes
 - ◆ 36 homes (~25%) had Rn levels greater than the USEPA “action level” of 4 pCi/l air
 - ◆ Action level carries lifetime lung cancer risk equivalent to smoking 1-2 packs of cigarettes per day
 - ◆ 29 homes (~20%) had Rn 2-4 pCi/l
- ◆ Estimated 80% of homes with high Rn located on outcrop of uranium-bearing rock formation
- ◆ Mitigation measures shared with residents; retests anticipated in 2007



John Plummer, NNEPA Radon Program, shows Pipeline Road resident the charcoal inside a radon canister

Radon Facts:

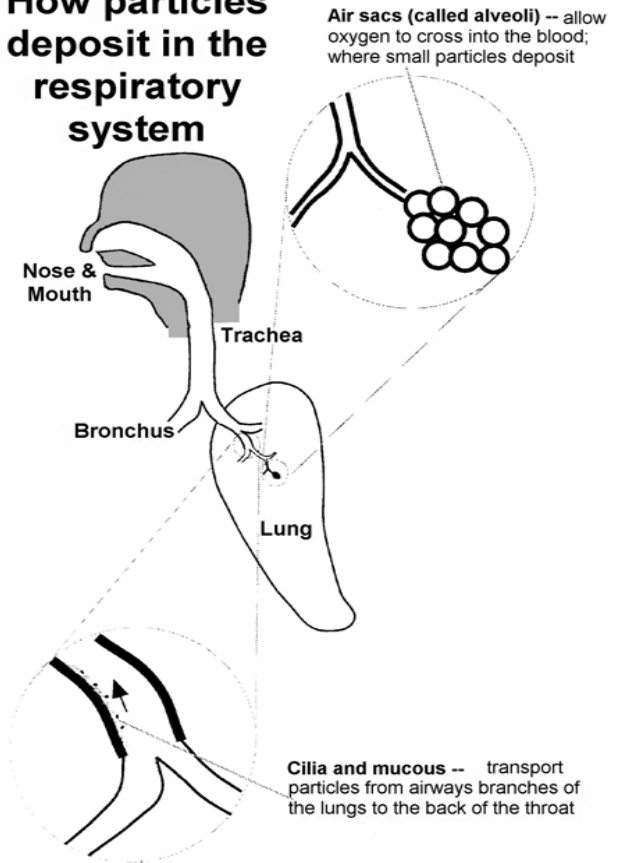
- Decay product of naturally occurring uranium (U-238)
- Released from soils, rocks
- Second-leading cause of lung cancer in U.S., according to USEPA

Air Particulate Monitoring

- Tiny dust particles irritate lungs, make breathing problems worse; can lead to more severe respiratory disease
- Dust may be contaminated with radioactive elements that occur naturally or from mines, mills
- People living near uranium mine wastes more likely to be exposed



How particles deposit in the respiratory system



Air Particulate Monitoring (cont'd)



- Monitoring began May 2006
- Two sites: Red Water Pond Road, Pipeline Canyon Road close to residences, abandoned mines
- Compare dust levels with federal particulate limits
 - Thru Feb. 2007, highest 24-hr concentration was 15% of national air quality standard for particulate matter
- Requesting USEPA-LV lab analyze 10% of filters for radionuclides
- Develop, validate predictive model of inhalation exposure

CRUMP Recommendations



- Create, fund federal abandoned uranium mines cleanup program
- Develop, expedite comprehensive health studies in uranium-impacted Native American communities
- Navajo Nation: Develop its own regulatory programs for addressing cleanup of AUMs, conducting health studies
- Replace contaminated wells with new wells that tap high-quality aquifer in Eastern Navajo Agency
- Remove all mine wastes from Northeast Church Rock Mine site, which is tribal trust land
- Conduct radiation surveys needed in residential areas affected by AUMs in at least 13 chapters of Eastern Navajo Agency
- Retest homes with high radon levels in Churchrock area
- Continue, expand air monitoring in residential areas near mines